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ABSTRACT

This report of the first regional CUEBS conference on the subject of the preparation of college biology teachers contains: (1) a schedule of the conference; (2) a list of the participants; and (3) summaries of the major papers and discussion as well as the reports of the working sessions. The papers included: "Problems in the Administration of Teaching" by Erich Steiner, "On Becoming a College Teacher" by Frank M. Koen, and "Technological Aids to Education" by Hazen J. Schumacker, Jr. The working sessions concerned themselves with: (1) "a model program for making the teaching experience a learning experience for the teaching assistant;" (2) "a model program for the orientation of new teaching assistants;" (3) "alternatives to the traditional Ph.D. program;" and (4) "the proper role of research in the proper preparation of college biology teachers." The report concludes with brief statements by the participants of what was being done at their institutions to improve preservice preparation of college biology teachers. (AF)

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MEMO NO. 70-3

ANN ARBOR CONFERENCE ON PRESERVICE PREPARATION OF COLLEGE BIOLOGY TEACHERS

January 8-9, 1970

This is the report of the first regional CUEBS conference on the subject of the preparation of college biology teachers. Participants came from twenty-one universities in that area from Minnesota to Ohio which produce about one-fourth of the annual supply of Ph.D.'s in biology. They were selected with great care from the administrators, faculty, and graduate students recommended by correspondents who were asked to name the people at their home universities most able to make a significant contribution.

The conference was devoted to solving the problems involved in the preparation of college biology teachers, not to discovery of the problem. Those attending were people who had already wrestled with the issue and did not need to be told that the goal was a worthy one and that the obstacles were formidable.

An earlier conference held in Washington in September outlined the problem vividly. As stated in the report of that conference (CUEBS News Vol. VI, No. 2, December, 1969) ... "The university is the only place where future teachers in universities and in colleges of all types can learn to teach undergraduates. If the job is not done by the universities, it is not done."

The fact that at many important universities, little is done

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to prepare the future college teacher does not obscure the fact that at some universities administration and faculty are struggling valiantly with the problem.

One part of the challenge, implicit in the discussions at Washington, was that teaching assistants are de facto faculty members and the quality of their performance is a significant component of the quality of teaching at the university. At the Ann Arbor conference, reported here, this fact was made strikingly clear by one example. It developed in the discussion that of the credits earned by freshmen and sophomores at the University of Michigan, two-thirds are received in classes taught by teaching fellows. If the teaching fellows at a given university do not know how to teach, the university will reflect this deficiency in quality of instruction as surely as the institution hiring the new Ph.D.

The University of Michigan was chosen as the site of this conference in part because of its location, but, more important, because it is one of the major universities demonstrating a commitment by the administration and departments to the preparation of outstanding college biology teachers. The university maintains a Center for Research in Learning and Teaching which works closely with departments. The Botany Department participates in a program sponsored by the Danforth Foundation designed to improve preparation of college teachers. The Zoology Department has also experimented with new ways to instruct teaching assistants.

Much of what happened at the conference appears in the summary that follows, but even more can be found in the ideas exchanged among people with a common concern and in the renewed endeavor at the home campuses to solve this important problem. It seems reasonable to hope that those who came to the conference with plans for contribution to the preparation of future teachers were supported by the discovery that others thought their efforts worthwhile. It is also hoped that ideas developed on one campus will diffuse to others and that the process of reinforcement and diffusion will be extended beyond the conference by means of this brief written summary.

Thanks are due the participants, many of whom gave up important commitments to attend; to the panelists, discussion leaders, and the speakers listed in the program; also to Dr. Sanford Erickson who contributed much to the planning. We want to thank Dr. Paul Gerhart of the Extension Service whose quiet, effective performance kept the wheels turning smoothly. We are grateful to the University of Michigan which was so generous in sharing its staff and facilities; we could not have been more hospitably treated.

Donald S. Dean
Staff Biologist

CONFERENCE ON PRESERVICE PREPARATION OF COLLEGE BIOLOGY TEACHERS

University of Michigan

Thursday, January 8, 1970

8:30 Registration

9:00 Welcome Dr. Alfred S.Sussman, Associate Dean
College of Literature, Arts, and Science

Orientation to the Conference

Dr. Edward J. Kormondy, Director of CUEBS
Dr. Donald S. Dean, Staff Biologist, CUEBS

9:40 On Becoming a College Teacher
Dr. Frank M. Koen, Center for Research in
Learning and Teaching, University of Michigan

10:50 Coffee

11:05 Problems in the Administration of Teaching
Dr. Erich Steiner, Chairman
Department of Botany, University of Michigan

Discussion

Dr. Joseph R. Larsen, Head
Department of Entomology
University of Illinois, Urbana

Dr. Frederick Forro, Jr., Head
Department of Genetics and Cell Biology
University of Minnesota

Dr. George Kiefer
General Education Biology
University of Illinois, Urbana

12:15 Luncheon at League

1:30 Bus pick-up for Botanical Gardens

1:45 Tour of Botanical Gardens

2:45 Working Sessions

A - Model Program for Making the Teaching Experience a Learning Experience for the T.A.

Dr. Gerson Rosenthal, University of Chicago, Chairman

B - A Model Program for the Orientation of New Teaching Assistants.

Dr. Michael Forman, Purdue University, Chairman

C - Alternatives to the Traditional Ph.D. Program

Dr. Alfred F. Borg, NSF, Chairman

D - What is the Proper Role of Research in the Preparation of College Biology Teachers?

Dr. Norman S. Kerr, University of Minnesota, Chairman

4:45 Return to the University

5:00 The evening free for unstructured discussion by participants.

Friday, January 9, 1970

9:00 Technological Aids to Education
Mr. Hazen J. Schumacher, Jr.
Television Center & Center for Research in Learning and Teaching, University of Michigan

Demonstrations and examples of the use of television and film in education

Discussions by participants: Technology and the Changing Role of the Instructor

11:00 Report of working groups

Summary of the conference

12:00 Conference ends

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Introduction to the Conference

Dr. Alfred S. Sussman, Associate Dean of the College of Literature, Arts, and Sciences, University of Michigan.

Dr. Sussman welcomed the group to the campus and said that he looked forward to hearing the results of the conference. He continued with the remarks quoted below.

I will use the privilege of this forum to express some biases. I think what I will do is to set them in the perspective of some predictions which I have read about in the Chronicle of Higher Education, (November 17, 1969). Some of you may have seen the report by Ralph Tyler who was the Director of the Center for the Study of Higher Education at Stanford for a while. He was asked by a congressional commission, the Joint Economic Committee of the Congress, to study higher education and its funding for the future. I have excerpted from his studies some of the things I thought would be relevant to your endeavors today. I hope to mention them briefly and still stay within the time allotted me.

The first of the thirteen or fourteen predictions which I have selected--I will not use all of them--is that there will be an increase in importance of the community and junior colleges. Probably you will say, so what else is new? You have read this prediction before. I agree. With at least one junior college being established every week in this country, this is quickly adding up to a big business. Now, questions that are relevant to us include who will train the teachers of these schools. Increasingly, they are being released from the grasp of the public school administrations who have discovered that although there is prestige in dealing with these schools, in fact, the funding costs are a lot more than they wanted to get into. I have just returned from doing some work with a community college and I learned that indeed this very situation exists there. The people in the community college are still under the direction of the public school system, but the public school system is learning that it costs more money to work at the higher levels of education, so they will be divesting themselves, I am sure, of this responsibility soon.

This leads to the issue of whose responsibility it will be to train the biology teacher in these numerous institutions: who increasingly will be training the undergraduates in the first two

years? And if that responsibility is taken by us, by you, what kind of training should these teachers receive? Should it be the same as that received by people who will be teaching in schools with which we are identified or should it have a qualitatively different component? I think these are issues that are going to be increasingly vexing and important lest we surrender this responsibility to less well equipped institutions.

The second prediction I want to mention is the increased separation between the education of freshmen and sophomores and the research and graduate functions. This may surprise some of you, but Ralph Tyler believes very strongly that there will be increased differentiation between the undergraduate levels in the first year of teaching and the research, graduate, and senior functions. His reasons are persuasive to me, but as you will recognize, they are still controversial. He says that legislators are increasingly wondering why state university expenditures per student have to be five times greater than they are in junior colleges and community colleges--a reasonable question. People are also wondering why, even if you grant the use of this increased expenditure for teaching undergraduates, is it that there is impersonalization and depersonalization of teaching in the large institutions? Furthermore, many of the faculty are getting restive under regimes where they are battered and buffeted by the taunts of students, by the convictions of those who have become the shrill minorities demanding non-negotiable changes, so the faculty members who are interested mainly in research are abandoning the universities to go to places like research institutes. They are asking themselves, can I not do more research in institutes, including those in government, than at universities? And so, Tyler says, he sees a trend toward the abandonment of academe by some of the best research people (I said that this would be controversial). The faculty, therefore, at least some of the research faculty with the strongest degree of interest in research will abandon the universities. The implication, if Tyler is right, and I do not fully accept it myself, will be that there will perhaps be more tendency toward the relaxation of standards with respect to the degrees that are used for teachers. Maybe we will be moving more strongly toward the non-research degrees, such as candidate's degrees and the kind at Yale where no research thesis is required. Some people are seriously suggesting, even among the staff at Michigan, that community colleges should have staff with degrees which require the assembly of data for reviews, rather than the generation of data <u>de novo.</u>

Another prediction I should like to mention is the increased importance of institutions enrolling less than 2000 students. I do not know how many of you are from such institutions, but Tyler confidently predicts that the predomination of institutions like Michigan in higher education, at least in the training of under-

graduates, reached its peak several years ago and that in the future smaller institutions will be attracting an increasingly larger proportion of students and, perhaps, even of faculty. The pressures that lead to this prognostication include the fact that the faculty and administration worry about the increasing red tape in institutions that are as large as Michigan. Sometimes, I confess, I predict confidently that Michigan is going to come to a grinding halt, constipated by the glut of paper that it ingests daily. And, having generated enough of this myself, my prognostication is authoritative.

In addition to this, and perhaps even more important given our society, the economic facts are that we may have reached the point where the economies of scale which permit doing things more cheaply the bigger you are have now been superseded; beyond a certain point we no longer save by being big and we are reaching the point when many universities are at more expense in doing certain jobs than are the smaller schools.

A third point, to which I will return later is that the impersonality that people talk about in the big universities has come to the attention of parents and legislators. The support that used to be generated by universities, the pride of many states including Michigan, is now being eroded by criticism, in some cases justified, of the quality of the teaching. So I believe that there will be, increasingly, a warming trend toward smaller institutions.

What are the implications for us? It seems to me that one of the implications is that, since most of the training of teachers goes on in schools that are large like ours, we must ask where potential teachers are to get practice in teaching at smaller institutions? Where are the impulses for associating with small faculties, in small towns, generated? What motivates people who are increasingly urban and urban-oriented to go to small colleges to teach? I do not know but I suppose that some of the programs that might be interesting in this regard are those like the "Michigan Scholars," wherein a deliberate attempt is made to introduce teaching fellows to small college life by replacing faculty such institutions who are going on leave. Perhaps, that kind of thing has to be done increasingly.

Then there is the wider range of students that Ralph Tyler confidently predicts will be part of the future of American education. Probably you have believed that heterogeneity characterized your student body today. But Tyler points out that they will be even more heterogeneous in the future. The range of qualifications will be exceedingly wide; we will be taking people who before were considered uneducable and attempting to push them even beyond the community college. Of course, there is the usual stock of excellent people at the other end of the scale. How, then, to play one end

against the other and still preserve the quality of education? The implications of this for teachers are plain: One has to contend with heterogeneity; one has to develop the kind of skills that enable you to preserve the confidence of the poorest student and still not lose the better students. These are problems of teaching.

Now a rather disturbing kind of prediction--if one thinks of the power structure of the university one thinks now of the board of regents and the president on one hand, and the faculty on the other. It is clear that this is shifting but it is shifting in a couple of directions which may be good and bad. Power may be shifting increasingly toward the intrusion of students into university government (which has many good features), and parents (which has some good features), and legislators (which has few good features). But, according to Tyler, it is a fact of academic life that increasingly in the future there will be a shift away from faculty power, with administrations, students and others gaining some of what we lose.

If Tyler's prediction is correct it means that intrusive legislators, parents, and students will come to influence policy. The effect upon teachers, it seems to me, is plain. It is not an abstraction any more to worry about whether even the teaching of evolution is something that a self-respecting teacher can do without fear. Recent pressures in California to present alternative views on evolution--although in the abstract they may seem reasonable--lead to increasing polarization between universities and the people in the street, and to the erosion of a vital aspect of academic freedom. I view this with a great deal of unease and I hope it does not presage a new kind of know-nothingism in American education.

I think I can stop at this point and give what I think are the conclusions to be drawn from these predictions. I think it is clear that growth is inevitable; and change will accompany growth. But despite such change, I think there are some constants that the teacher has to face. Among the constants that I think are most important, and which pervade all the predictions of Tyler, is that which I label the personal qualities of the teacher. Now I am not pessimistic about the training of teachers when I say that I believe that personal qualities are all-important and yet the most difficult to instill. Think of the need for these inner qualities, the ethical and moral strength in the face of communal pressures, which I think increasingly will develop in our society; the willingness to learn in the face of the fast pace of learning, something we hope to instill in our students as well; the dedication and responsibility to play various roles, to work in large or small colleges, to work in community or four-year colleges, to work with advantaged and disadvantaged students--the diversity of roles that the teacher will have to play in the future is staggering. There-

fore, when you conclude this conference I hope the personal qualities of which I have spoken will have been considered along with technological advances. Without the former, no amount of technical skill or knowledge can forge the truly excellent teacher.

Problems in the Administration of Teaching

Dr. Erich Steiner, Chairman
Botany Department, University of Michigan

Discussants:

Dr. Joseph R. Larsen, University of Illinois
Dr. Frederick Forro, Jr., University of Minnesota
Dr. George Kiefer, University of Illinois

The Botany Department of the University of Michigan is one of the departments which has operated under a Danforth Foundation Grant to improve the teaching competence of its graduate students. Dr. Steiner, chairman of that department, discussed some of the problems of administering the development of good teaching.

He expressed his opinion that the way to get good teaching is to choose first-rate people and give them plenty of freedom. He pointed out, however, that by a first-rate person he meant someone who had essentially the qualities Dr. Koen had pointed out as those possessed by a good teacher.

He spoke of the time in the past when graduate students gained their teaching competence in an apprentice system. The graduate student assisted a senior staff member in the laboratory discussion section for two or three years before he was given responsibility of a section of his own.

In contrast, he told how the graduate student of today finds himself before a class a few days after he has arrived on campus. He spoke with sympathy of the new bachelor of science confronted with the responsibility of adjusting at once to a new course, a new department a new institution, and often for the first time in his life, a graduate school in a university. Further, the graduate student charged with the responsibility for a section feels insecure in mastery of the content. He may have had courses in a number of areas, but in the typical case the courses by now are vague and part of the dim past. His insecure grasp of content does nothing to bolster his confidence.

The neophyte teacher has much to learn about teaching. At the University of Michigan, the beginning botany course makes use of an audiotutorial laboratory; graduate students handle the recitation-discussion sections. Students in these sections have already had a lecture and a laboratory and "need most of all a chance

to see what they know and to exchange some ideas." The inexperienced teacher finds it difficult not to lecture to these students. Dr. Steiner deplored the fact that the least experienced teachers are expected to do the most difficult type of teaching.

He continued with another problem to be solved. He said, "We are teaching a science and the main purpose of the course is to get across to the freshmen and sophomores some understanding of what science is and how it operates. The new teaching assistant generally has not yet had any research experience. I feel very strongly that if you are going to teach in a science it is highly useful to have experience in science, to know what research is, to know what publication is."

Dr. Steiner made very clear that he thought any degree for prospective college teachers should involve such an experience. He reiterated, "I say that the person who is doing the teaching should have some creative experience and know how to bring it to fruition--to communicate." He amplified his point by saying that, though he would have to sell the ideas to some of his colleagues, he personally thought it "highly legitimate to think in terms of a degree where the creative effort is in a teaching approach or innovation in teaching."

He described the program in his department and the involvement of the Danforth Foundation program.*

New graduate students arrive a day or two early and the department provides an intensive two-day workshop which serves a variety of purposes. There is an orientation to the department, its facilities, and its operation. There is a thorough content orientation to the work to be covered in the first two weeks. Since each graduate student will provide a certain amount of service in the audio-tutorial laboratory, they must become throughly acquainted with the laboratory materials and procedures.

Considerable effort goes into the instruction of the graduate students in the techniques of leading recitation-discussion sections. Demonstration discussions are staged to show some of the various techniques that can be used in this situation to get the students to participate and to exchange ideas with the instructor and his fellow students.

*(See further details in the attached Memo to Faculty no. 37).

With this preparation, the students are turned loose for the first few weeks, "hopefully with enough confidence about what they are doing to get under way."

During the semester, there are weekly prep sessions which serve the same purpose as the fall orientation. They emphasize both content mastery in terms of the specific materials to be studied and the teaching techniques best used to present these materials. In addition to these meetings of the small group of people without previous experience, there are weekly meetings of the whole teaching staff. These afford opportunity for some interchange on teaching problems as well as necessary discussion of administrative matters.

Dr. Steiner indicated that he regretted that his department had not been able to provide a regular faculty member to supervise teaching assistants as some departments in the Danforth program had been able to do. Instead, he appoints a Danforth supervisor, an experienced teaching assistant about to receive his Ph.D. He had abundant praise for the performance of these teaching supervisors: "They have done an excellent job. I could not have asked for a better performance."

He continued, "During the first semester, then, as many new people as we can manage within our budget are designated Danforth fellows and they are put under the direct supervision of an experienced teaching assistant. Initially that assistant goes into the class quite often. Subsequently they have conferences about grading procedures, design of examinations, and other matters related to teaching.

"Gradually as the semester progresses, the supervision becomes less and less so that by the end of the term we have done about as much as we can. As Dr. Koen said, a year is about the longest you can carry out one of these programs."

Dr. Steiner answered a number of questions.

1. The special program for Danforth fellows is built around only one course in order to limit diffusion of resources.
2. Sessions on teaching techniques are run by Dr. Steiner, his coordinator of the course, and by people from the Center for Research in Learning and Teaching.
3. He agreed with a questioner that it would be desirable for second-year students to teach the introductory course if the problems preventing this could be overcome.

A member of the panel asked whether they had problems of status for teaching assistants. Dr. Steiner replied, "No, in our department teaching fellows have as high status as research fellows. As a matter of fact we insist that every graduate student teach at least one year. From my experience, in some few cases where students have been on a fellowship for four years they lose touch with the rest of the department....By being in the teaching program they are somehow swept into the graduate life of the department. It may only be a coincidence that teaching fellows enjoy high status in our department, but I am grateful that they do."

Dr. Sussman added from the floor, " I think you have been saying that you and your predecessors have made a deliberate attempt to bolster the prestige of the teaching fellow. There are frequent meetings between you and the staff--but only the teaching staff. They are given certain privileges in the department office. There are other little things that add to this gestalt, this aura of prestige. The department has to exert itself in that direction in order to prevent the prestige of the research assistant from taking over."

On another topic, Dr. Steiner commented, "One of the things that disturbs me about the audio-tutorial system is that, being more rigidly structured, it suppresses individual innovation and originality on the part of the T.A.'s. In earlier years we used to get together for our weekly meetings and one would say,'Hey, I just thought of a great experiment .... and we would all put our heads together and decide whether we would use his new bright idea. It is still possible for a person to do this with a recitation technique but unfortunately it is not as likely. "This is something we have lost."

Dr. Kiefer made a stout defense of the audio-tutorial laboratory, "We have audio-tutorial laboratories in our general education biology course and we have a large number of potential high school and college biology teachers assisting in that course. I have found that this program is a learning experience for them. Their own ability is enhanced by involving them in more activities in comparison with the more routine procedures when the master instructor was responsible for the major presentation and the T.A.'s were divided among twenty different sections, in effect twenty different classes. By involving the student in the A-T operation, by having him lead discussion sections, by having him involved in quiz sections, by involving him with demonstration materials and the actual preparation of taped materials he more freely can exercise his independence and initiative

in developing new and exciting things. I think A-T does provide opportunity for real on-the-job training experience."

Asked if his T.A.'s make tapes, Dr. Kiefer responded; "they do prepare materials for tapes, and I, as overall supervisor, interdigitate this with what else is going on."

Dr. Steiner was asked how they evaluate their program. He indicated that they are still struggling with that problem. At one time they had T.A.'s write out objectives for a particular week's recitation and subsequently attempted to assess their success from evidence in students' papers. Since then, they have worked out a system for monitoring the performance of a teaching assistant in the laboratory and comparing his performance with the performance of someone who had not been part of the Danforth program.

He said that supervisors visit classes routinely. These visits are done so regularly that they provide a basis for judgment and can be made in a relaxed manner.

On Becoming a College Teacher

Dr. Frank M. Koen
Center for Research in Learning and Teaching

Before addressing himself to his major topic, the considerations involved in designing of a program for training college teachers, Dr. Koen established these fundamental points:

1) "There is no such thing as the possibility of training graduate students to be college teachers in any significant sense without a strong administrative commitment."

   He said that of the two major missions of the university, research and teaching, the generation of new knowledge was clearly the mission of the research-oriented department. The responsibility for teaching in the university transcends department boundaries and is an inescapable responsibility of the university as a whole. "The whole business of teaching is assuming the proportions pf a scandal among the Ralph Naders of the academic world. The teaching problem is the problemsof the institution; the institution is going to have to do something about it."

2) "The training program for college teachers calls for something that is almost never done: rigor us, systematic evaluation of the program."

3) "Graduate students are very bright people. They know how the reward system works. Therefore training in teaching must be professionally advantageous to these people. They are not stupid. Pious words to the effect that 'teaching is important in this university' do not sway them."

4) Dr. Koen explored the merits of a Ph.D., defined specifically as a research degree on this basis: "The man would go through all his work and develop his expertise up to the dissertation. The dissertation would become research in teaching the subject. He would design an advanced undergraduate course, offer it, teach it, rigorously evaluate it on a priori grounds, and write it up." In his opinion, such a program would be more significant, more challenging, more difficult than 90% of the dissertations now coming out of biology, physics, or psychology.

Returning to his major topic, setting up a program for training college teachers, Dr. Koen said two basic principles underlye the whole approach:

1) "A person gets better at what he practices."

2) "Students will do what they feel is rewarding, what is in their immediate self-interest."

He marveled that ideas so obvious, but so well substantiated by scientific studies, should be so often ignored in practice.

He said that the approach to the problem of preparation of college teachers should be systematically organized about these important points:

1) One must ask what are the objectives of the program

2) One must decide what must be done to achieve these objectives

3) Evidence must be gathered to determine whether the goals have been achieved.

4) Results must be compared with goals and appropriate revisions made in goals, methods and/or the kind of evidence collected.

Turning to the participants, he asked them to name some suitable objectives of such a program. Among those named were development of skills in solving problems so that this same problem-solving approach could be communicated by the teacher, the development of presentation skills, the development of skills and techniques of evaluation of performance. One named three objectives:

1) Review or teach the course material

2) Acquaint graduate students with techniques for presenting the material to students.

3) Teach them the mechanics of the system : stockroom equipment, etc.

Dr. Koen suggested that one way to attack the problem was to ask what a good teacher does. He distinguished between the effective teacher and the good teacher. "The effective teacher is one who can establish instructional goals for his students and can attain these

goals. The good teacher is the effective teacher whose objectives are the right ones."

Dr. Koen did not underestimate the difficulty of deciding the right goals. He pointed out that this involves value judgments which each instructor has to make for himself, but "the must be reinforced or reined in by his peers." He proposed to discuss effective teaching since he did not presume to make these value judgments.

He described the elements of being the effective teacher thus:

1) A mastery of content. "He knows his stuff."

2) The ability to organize a domain of knowledge (this includes the design of the course.)

3) Effective presentation skills

He expanded on the third point, saying that he would prefer to think of these skills as the management of learning rather than what one does in front of a class. He expressed the view that very little learning takes place in class, but much learning develops from assignments. "This means," he said, "that you can not identify effective teachers by sitting in their classes once a semester."

He pointed out that it is easy to say "throw the lecture out" but very difficult and creative to think of a manageable alternative.

Dr. Koen made much of the need for teachers to have a large armamentarium of presentation skills. He said that for a graduate student to learn to play the many roles which are demanded of a faculty member, he must play the many roles while still a graduate student. Future college teachers need multiple experiences and need practice in many roles.

4. Rapport with the students

He said on this point that the "God complex" that afflicts teachers lecturing to a huge section interferes with the learning. "How you come through as a human being, whether you have respect for the people you teach, how you relate to the student" are all important.

5. The teacher's evaluation of his own teaching

6. Professional competence

By this he refers to all of the role abilities discussed as well as ethical problems of being a teacher, and the development of a personal philosophy of education ("Every time you get up before a class you display an implicit philosophy of education.")

Dr. Koen reiterated the need for these elements in a training program:

1. It must be rewarding to the participants

2. Progress is a function of the time spent on solutions to educational problems.

3. There must be someone or some mechanism to guide the student.

The beginning teacher needs help in seeing the problem and he needs to develop teaching techniques. At Michigan they have found that older graduate students interact with beginners in a very productive way. The senior ones develop enormously in their sophistication in teaching by acting as advisors to the young ones.

Dr. Koen asked what kind of evidence one would look for to determine whether the program developed was achieving the goals. He said that a program should do something about all of the six points he set forth above. At the University, they will follow last year's graduates to determine how effective the college teacher preparation program really was. They hope to evaluate the efficiency of the program by asking the new teacher what was expected of him and how well he feels he was prepared.

Technological Aids to Education

Hazen J. Schumacher, Jr.

Television Center and Center for Research in
Learning and Teaching

Mr. Schumacher has worked very closely with departments of the University to develop teaching materials to implement their teaching plans. He has been particularly interested in the use of educational television and film.

He related his demonstrations and discussions to the theme of the conference by emphasizing the fact that a modern teacher is a manager of education, not merely a performer. To exploit the resources available to him for facilitating learning by the student, he must know how to use the various techniques, media, and approaches with skill and wisdom. He said that one component of the job is to know what tools are available and how best to use them.

He emphasized that the medium must be determined by the subject matter; "faculty members must not get hung up on one medium."

Mr. Schumacher demonstrated the use of a live television camera and showed video film clips which had been carefully chosen to illustrate various aspects of the use of this medium.

His examples were drawn from the fields of zoology, pharmacology, postgraduate medicine, the dental assistant program, and the training of a key-punch operator. Of particular interest was a sequence showing a teaching assistant in zoology teaching a class. He showed how television can be used in helping neophyte teachers analyze their performance.

He discussed at length the question of the ethical use of materials prepared by others. Those attending engaged him in a discussion of residual rights of faculty members, plagiarism, and the copyright laws. Many had questions about the equipment itself.

Dr. Koen took the last few minutes to put the demonstrations in the perspective of a training program designed to develop effective teachers.

Working Group A: A Model Program for Making the Teaching Experience a Learning Experience for the Teaching Assistant

Participants: Anderson, Costello, Daniel, Hagerman, Husband, Nisbet, Thompson

Gerson M. Rosenthal, Chairman

Our group was in remarkable agreement as to what should be done, at least at the level of principle, and very likely could produce a fairly complete model were our universities more similar and if our product and its market were more uniform. We simply recognize that the interests, needs, and career goals of graduate students are variable; departmental emphases also differ.

To simplify this summary, I will make the debatable assumption that our universities are committed to producing, in adequate numbers, the best possible teachers of undergraduates. This assumption permits us to duck the issue of the conventional research-oriented Ph.D. program versus the instruction-oriented graduate program by suggesting that there might be some relaxation of the usual thesis requirements in those instances when it makes sense to do so. This is not to suggest relaxation of standards for a second-class student or program but rather the introduction of intelligent flexibility.

Our model, then, calls for two obvious kinds of personnel: faculty and graduate students.

1) We need some number of faculty members who are able, committed, and desirous of devoting the necessary time and energy to teach undergraduates and to the education of graduate students who may continue this commitment. Further, and perhaps more important, it requires that those faculty members not so involved recognize that such activities are not only necessary but honorable and deserving of recognition and support, both moral and substantive.

2) We need the participation of all graduate students--or at least most of them, for one can conceive of a few students for whom experience as a T.A. would be traumatic to all involved. I choose to overlook the obvious fact that we must use most graduate students simply to get our teaching job done but would emphasize

the view that some teaching experience will, at least. require an increased mastery of subject matter, may provide that sample of experience that influences choice of career, and is, of course, an absolute necessity for those whose intent to become strongly involved with undergraduate teaching.

More specifically, our model is concerned primarily with the doctoral candidate since there is more time available for his education and training and because it seems likely that some kind of doctorate will more and more become a requirement for teaching at all levels beyond the high school.

We propose the following:

1) All graduate students should serve as teaching assistants for a minimum of one year, preferably two or even more if they wish. This will permit assistants a more complete experience by beginning at the bottom with work in the prep room and gradually moving from aide and observer to true teaching assistant, primarily in the laboratory, and ultimately to leader of discussion sections and occasional lecturer (this sequence should be less rigid than the listing suggests).

2) Instruction of assistants with regard to specific handling of laboratory and discussion sections is the major responsibility of the faculty. Frequent meetings, probably weekly, are necessary and require prior preparation on the part of both faculty and assistants. These sessions should provide not only review of subject matter at a level appropriate to the interest of the assistant and to the understanding of the student, but the opportunity to raise questions of scientific and pedagogical interest, the latter ranging as broadly as possible. Some of the panel feels that some or much of this instruction may be advantageously handled by a senior pre-doctoral student who is well acquainted with all aspects of the course (serving as the faculty deputy) and who may be closer to the assistant both in time and attitude than is the instructor. In any case final responsibility for this instruction rests with the faculty member.

3) Some sort of program, possibly a seminar, should be required of all assistants. This program should be planned by biology faculty and should be concerned with methods, philosophy of teaching, curriculum and course construction, educational goals, course and teaching evaluation. The knowledge and talents of all appropriate faculty members, including those outside of biological departments. e.g., those in mathematics and statistics, education, psychology and philosophy, should be exploited. Course credit for this discussion is desirable and probably necessary.

4) Interested students should be encouraged, but not required, to take courses offered in other departments that may broaden horizons or lead to increased professional competence or outlook.

5) As assistants mature they should be encouraged to make constructive criticisms of the courses in which they are teaching, propose exercises, discussion topics and changes or additions to subject matter coverage as their expertise and experience suggest.

6) The performance of assistants should be evaluated in writing, at least briefly, and verbally in conference between faculty and T.A. This is for the benefit of the T.A. and is quite different from the kind of statement one writes in letters supporting job applications. If course credit for assisting is given (discussion indicates that this is presently uncommon), whether as inducement or reward, honest grades should be assigned -- faculty members should feel no compunction in grading down a student who does not perform satisfactorily or shows poor attitudes toward his teaching obligations. Senior assistants are effective evaluators and student response, via well constructed questionnaires (or even less formal feedback), is also useful.

7) Departments or larger administrative units should consider hiring a specialized faculty member whose prime function will be to develop programs of instruction, both as regular curriculum and special training of assistants (who are our future faculty members). This is not a simple issue, particularly at highly research-oriented institutions.

The foregoing is oriented toward the teaching of introductory biology courses. We also recommend assisting experience at the upper division course level; such experience involves modifications of the model for emphasis on the pre-professional training of undergraduates and includes a close working relation of a faculty member and one or a small number of assistants as a reduced course enrollment demands.

We are, I think, less sanguine about T.A.'s who are seeking a master's degree. At the moment such T.A.'s are necessary. As a group they are on campus for a shorter period of time than pre-doctoral T.A.'s, probably of lower intellectual caliber - although they vary individually and with the institution. They are in need of greater supervision and more intense training. As much of the model program as possible should be available to them, but one may hope that their numbers will diminish in the future.

What we propose may be profound and elegant or platitudinous and frivolous depending on your view. There is probably no best model - but certainly there are bad ones. Speaking for myself, I have a firm faith in the ability, seriousness of intent and good will of the young graduate student. My faith in the faculty is less profound but buoyed up considerably by what I have heard in these sessions. Ultimately the faculty will shape up whether from a true awareness of the importance of the teaching function, enlightened self interest or through external pressure from students -- which is already strong --, administrators, legislators, and the general public.

Working Group B: A Model Program for the Orientation of New Teaching Assistants

Participants: J. Jackson, P. Jackson, Koen, McCleary, Noble, Steiner, Strauss

Michael Forman, Chairman

A program for the orientation of new teaching assistants must have the full and complete backing of both the school administration and the departments involved. An orientation program to be effective must be more than an introduction to an institution or course. Proper orientation in a broad sense is basic to the entire teaching experience and should be part of a program that continues throughout the year.

We propose a model program with three major components:

1. Institutional Orientation

This orientation should be a function of the appropriate administrative unit: department, college, or university depending upon the local situation. It is important that teaching assistants within this unit be brought together so that they find an identification with a group of people with common concerns.

This orientation should include a statement of the philosophy of the department and a statement of the department's commitment to the teaching assistant program. If this is a departmental orientation, it would be appropriate at this time to familiarize the new teaching assistant with the general facilities available, the scope of his duties, and a general feeling of group organization and identification. In addition to active participation by staff members including the department chairman, an important role is envisioned for senior assistants in the handling of such an introduction. Senior assistants can be identified by new assistants as ready source of help and initial guidance.

The preparation of a general handbook listing facilities for teaching, outlining the mutual responsibilities of the teaching assistant and the department, and generally reinforcing the introductory meeting is considered desirable. Such a

handbook might also provide suggestions on common techniques such as leading discussion groups and field trips, etc. Mr. and Mrs. Jackson brought to the meeting a preliminary sketch of such a handbook which they would be glad to make available to anyone interested.

2. Course Orientation

The teaching assistant must become familiar with the course he will teach. The orientation of the course should include such basic activities as auditing course lectures or taped programs and participating in weekly T.A. meetings. However, we felt that a viable orientation program should go beyond that. Critique sessions allowing for constructive criticisms should be a normal part of the program. We feel that such an experience would benefit the assistant in that it would allow healthy growth instead of perpetuating a defensive teaching posture. This type of activity could also make use of videotape and audiotape facilities for self-evaluation.

We felt that the professor in charge of the course could serve as major professor of teaching for the teaching assistants currently working under him. A proficient senior T. A. or instructor could also probably do this. Further, on the departmental level there should be a senior staff member to coordinate the whole T.A. program. He should be a person the assistant knows he can go to for advice and a person who helps maintain the quality of T.A. performance.

3. Continuing Orientation to Teaching

This would be a departmental function essentially consisting of a seminar program for the first year of an assistant's work. Problems encountered in the classroom or laboratory (i.e., learning theory, teacher organizations, methods of evaluation), should be discussed by various experts. Discussion of pertinent reading materials would also take place here. In this regard we recommend that CUEBS publish a list of suitable reading materials in the area of theoretical and practical aspects of teaching and learning. This would serve as a handy reference source for any assistant wishing to pursue this aspect of his training.

We recognize that in order to implement this type of program great changes in attitude on the part of the faculty, especially in large research-oriented departments are required. Moreover, department support must be continuous and real (acceptance of the T.A. as a colleague) for the program to be successful.

Working Group C: Alternatives to the Traditional Ph.D. Program

Participants: Davis, Forro, Horine, Hurst, Kiefer, Levine, Mayeda, Mertens, Press

Alfred F. Borg, Chairman

We began in traditional fashion by reviewing why it is that people talk about alternate degree programs. We became acquainted with one another as we restated the difficulties of reconciling traditional doctoral programs with the need to produce a variety of adequately trained teachers for the great spectrum of academic institutions from two-year community and junior colleges to multiversities. We then turned to discussion of specific programs.

We were fortunate in having present men from Ball State and the University of Illinois who are involved with innovative programs. Dr. Kiefer and Dr. Larsen of the University of Illinois at Urbana are actively engaged in the planning of a proposed Doctor of Arts degree. If approved, this unique doctoral program will provide sound training in teaching based on a strong background in both didactic work and "hard" research. Only those who have been actively involved in the planning can adequately explain the proposal, but some of the salient features can be mentioned here.

First of all, students selected for the program will have been over a long series of academic hurdles, i.e. through the master's degree. Thus they will have a high probability of continuing in the program and there will be no particular need to include a specific selective gate at some early stage.

The guts of the program appear in something called the tutorial workshop, a unique arrangement incorporating laboratory, classroom, and workshop all in one unit. Here in the four semesters of two academic years the students will get their training in the content of the discipline they choose. The Illinois people plan to do this in an unusual way. They will employ the broad resources of the university, drawing in not only experts from the specific disciplines, but also from outside science who can help construct intellectual

bridges to other segments of society. For example, people in law, engineering, economics, education and other major fields have readily agreed to participate actively in this effort to give prospective college teachers an introduction to how science, technology, and society look from their vantage points. How many of us can claim to have had any substantial contact with these fields? And how often it would help in our contacts with students!

The summers following the first and second academic years are specifically devoted to research. The first summer is planned as full-time "hard" research. In the second summer the student will be expected to write a research proposal based on ideas he has developed. I should like to add parenthetically that this writing experience, if supervised by an advisor with keen critical insights and a talent for patient guidance, could well be the most valuable single element in the program.

With this background of two full calendar years in advanced course work and research, the students will begin an internship. They will spend a full semester teaching under supervision in a cooperating college. This field work, carried out under much better conditions than the comparable "all but the dissertation" job, should do much to smooth the transition to full college teaching. This experience will be backed up by the following semester's work at the university, a semester in which the various parts of the program for preparing the person for college teaching will be brought together. A major part of this will arise from the feedback on the teaching internship. By this time - almost three full years of intensive activity - a student should be looking forward to the relative ease of teaching in a college.

But if the Illinois plan works out, he is not yet finished, and will not be until he retires from teaching! At intervals of three to four years each teacher will come back to the university for a booster shot on his scientific information and his thinking in the field of teaching. If he has any real interest in his field this kind of periodic refurbishment should keep him fairly well informed on what is going on. To my knowledge this kind of built-in plan for continuing education and intellectual refreshment has not been proposed before. It will be most interesting to see whether it works and what it takes to make it work.

Illinois is trying an interesting device, namely, to label this degree Doctor of Arts. They feel that to call this a degree in science education would burden it with all the unfortunate connotations and images which "Education" arouses in the minds of many scientists. We shall see.

Professor Mertens described the doctorate in science education at Ball State University. Ball State attempts to meet the problem of diverse interests and diverse needs of students by insisting that a student and his advisor be free to tailor programs to individual needs. Thus there is plenty of opportunity to construct a program of study which takes advantage of special talents and plans for the individual's career. If the student is intent on going into teaching in a two-year college, his program can be molded to meet the need. If a student comes along who is likely to wind up in a college or university where research is a large part of his regular obligation and he will divide his time between research and teaching, he can be guided into a program that includes a good deal of straight discipline-oriented research.

Obviously Ball State has an excellent ideal. It gets away from the concept that a doctoral program aimed at preparing people for science teaching must be exclusively this or exclusively that. It pulls the teeth of the argument between the advocates of straight content and those who are equally committed to method. How long can Ball State or any other institution maintain a workable balance, the necessary flexibility, and high quality? Internicine struggles in academia do not favor the continued existence of a balanced program.

Odds and Ends

Larry Davis of Notre Dame has a special interest in interdisciplinary programs. He feels that it will be very difficult to introduce interdisciplinary work within the framework of traditional doctoral programs because they are so strongly tied to specific disciplines. Thus he sees the Illinois and Ball State plans as offering ways for breaking the cycle.

Dr. Kiefer reported that 43 of 95 chemistry graduate students interviewed would have used the proposed Doctor of Arts program in preference to the conventional Ph.D. program if it had been available at the University of Illinois where they were doing their work.

We were fortunate in having a graduate student sit with us. He is convinced that his feeling of commitment to teaching reflects the attitudes of a great many of his colleagues. If he is correct, and we all hope that he is, we may be in for a renaissance in teaching. Is this renewed interest in instruction real and deep seated? When a group of graduate students asked permission to take over the laboratory instruction in a major course in a leading university were they doing so because of some positive interest in teaching? Or was it because the professor was doing things so badly? Or both?

"Alternate" degree programs are growing and more and more and more of our future college and university teachers are going to be trained in them. Our job is to see that proper standards of quality are maintained and that students are placed in the sort of program best suited to their talents and aspirations.

Coda

This was one of those rare meetings in which time did not press on us with a heavy hand. We could and did let the discussion range in various directions. One suggestion which struck some fire, though it was related peripherally to the topic being discussed, is described below.

TOWARD HIGHER STATUS FOR TEACHING

We will move much more rapidly toward solutions of problems of science education when we find ways to persuade our most creative scientists to spend a significant amount of their time, thought and energy on educational problems. Clearly the present scheme of things leads to greater and more tangible rewards from research than from teaching with the result that the bulk of the best talents tends to regard research as the desired major activity. Thus, even though a great many people enjoy teaching as such, they spend far more of their efforts on the research which leads directly to the scientific esteem and the rank and emoluments which we all value.

If teaching and the whole educational process are to get the attention they deserve from creative people, then teaching must be made competitive with research in terms of the rewards it brings. Is such a transformation even possible? We need to find out. Within the National Science Foundation several of us have discussed one move in this direction, namely a

program of National Science Foundation Professorships to be awarded to outstanding scientists who wish to spend full or part time, say for three years, on innovative teaching projects.

In our informal talks we have visualized a prestigious program of professorships at least equivalent in honor to the NSF Senior Postdoctoral Fellowships and Guggenheim Fellowships. Awards would be made to first rank scientists probably drawn from among those who hold the rank of associate professor or higher and those who hold distinguished chairs. A typical plan of action might be to spend half time or more for one year devising and writing up an improved way of presenting a course or courses, following this with a year or so of classroom testing and revision, and a final year of further testing if needed plus preparation of material for general publication. Originality in planning would be encouraged. Support might be provided in the form of salaries for the professor and required assistants plus travel, materials, and other expenses directly connected with the project.

Details aside, the object would be to draw into teaching activity those leading creative scientists who are the pace setters, those people who set standards and who are widely emulated by colleagues, especially younger ones. Such a commitment to teaching on the part of outstanding scientists should raise the stature of this activity in the minds of administrators as well as faculty and assist in obtaining for teaching a full measure of the rewards now available mostly through research.

This suggestion, outlined so very briefly, is in the talking stages, We solicit comments and questions on the general idea.

Alfred F. Borg

Working Group D: What is the Proper Role of Research in the Proper Preparation of College Biology Teachers?

Participants: Brandou, Finley, Hadley, Lesh, Overmire

Norman S. Kerr, Chairman

The role of research in the preparation of a college teacher should be dominant. This is especially true when the domain of research is enlarged to include creative efforts other than the conventional experiment. Significant in any research or creative effort is the communication to the academic and general communities. This emphasis on research, to be maximally effective, should start long before the student enters the graduate school.

Though research or creative efforts in general may occupy the most significant role in the preparation program, at least two other aspects need to be emphasized. The first is the addition of an adequate program to impart teaching skills to the vast majority of graduate students. The second is the development of the necessary breadth in the program of these students so that they can exhibit content mastery at introductory levels in a wide spectrum of biological science courses. This breadth also should enable the student to grasp the significance of findings from many fields and to present a more genuine picture of science.

The continuous support of the intellectual viability of the college teacher is a necessary concomitant to his quality teaching. The major public universities may well have to shoulder much of the initial responsibility for the provision of this input, since they can provide the prestige, the personal contacts and even the modest funds required for such an effort. Opportunities for exchange programs, seminars and campus visits should be explored, but personal contacts and individual efforts may be most productive.

DIRECTORY OF INTERESTS

One of the major objectives of this conference was to provide an opportunity for people with a common concern to exchange ideas and to communicate with people with mutual interests. To facilitate this exchange, participants were asked to contribute a brief statement of what was being done to improve preservice preparation of college biology teachers at their institutions or to indicate what aspect of the question interested them most. Since time was short not all had an opportunity to reply.

BALL STATE UNIVERSITY

Dr. Jerry J. Nisbet
Dr. Thomas R. Mertens

At Ball State they have developed a unique doctoral program for training college biologists. Dr. Nisbet is director of the program and he and Dr. Mertens both work with doctoral interns. They describe their program as follows:

In 1965 the Department of Biology at Ball State University introduced a new doctoral program which is designed to prepare college biology teachers. The new Ed. D. in Science is aimed specifically at the preparation of teachers for junior colleges and for teachers of lower division biology courses in colleges and universities.

The Ed. D. in Science includes the following components:

(1) A 60 quarter hour major in biology
(2) Two minors of 26 quarter hours each (one minor is in a field of science other than biology, while the second is usually in education).
(3) A dissertation (the topic may deal either with biology education or with basic science)
(4) A college teaching internship
(5) Course work and/or experience considered pertinent to the overall development of the candidate as a prospective college teacher

BALL STATE UNIVERSITY

Rationale:

1. The major in biology is designed to give the breadth of preparation which we feel is necessary for a person intending to teach general biology at the undergraduate collegiate level. Each candidate is expected to complete work or demonstrate competence in the fields of cell biology, developmental biology, genetics, molecular biology, ecology and organismic biology.

2. One of the minors is completed in a science that is related to and supportive of biology. These generally include earth science, physics or chemistry. The second minor is usually taken in a specialized field of education, such as higher education, curriculum or educational psychology.

3. The dissertation insures that the candidate develops research competence in a more specialized area of biology education (i.e., a problem related to biology teaching), or of basic research in pure science.

4. The internship affords the candidate a supervised experience in college-level teaching. Each candidate's assignment is determined so as to be supportive of his future teaching plans and may include large-class instruction as well as experience employing audio-tutorial instruction and an electronics response system of programmed class discussion. The specific course assignments include introductory biology courses for biology majors, elementary education majors or general education students, and methods courses intended for biology teaching majors or elementary education majors.

5. The final component of the program is intended to provide a common background in various broad fields of education for all doctoral candidates, regardless of their major field of interest.

BOWLING GREEN STATE UNIVERSITY — Dr. T. Richard Fisher

"We are endeavoring to utilize our General Biology program as a teacher training experience for our teaching assistants. This is accomplished by a different approach to the teaching of general biology laboratories in that the laboratory exercises are demonstration-discussion types demanding that the instructor lead the students through the exercise. In other words, the exercises are problem oriented, not "cookbook" exercises. Intermittently, the instructors are observed by the supervisor followed by a critique. We expect to expand this approach greatly in the near future."

CASE-WESTERN RESERVE UNIVERSITY — Dr. Georgia E. Lesh

"We are interested in speaking to people who have in their universities, programs which allow for a broader preparation of graduate students for careers in university teaching than our program allows. Some of the ideas we have been discussing are: reducing the required number of semesters of teaching, and replacing some of these with requirements for, e.g. designing an undergraduate laboratory exercise in their field of specialization. Alternatively, the replacement could be a series of lectures in an introductory or specialized course in their field, the designing an operation of an undergraduate seminar course, etc. If any of the conference participants presently have programs such as these we would be most interested in speaking with them."

UNIVERSITY OF CHICAGO — Dr. Gerson Rosenthal, Dr. Lorna P. Straus

"The University of Chicago is attempting to train college biology instructors primarily through the use of Danforth Fellowships. Applicants for fellowships must be senior graduate students who have passed their preliminary examinations and must express, in writing, a convincing interest in becoming teachers of undergraduates. By the terms of the grant, participation of fellows is restricted to courses in the introductory biology sequence.

"The program is basically oriented toward a single course (of limited enrollment) with a close faculty-fellow relationship that is concerned with matters of course construction and planning, presentation, grading and evaluation. The fellow serves as co-teacher and both

instructor and fellow are normally present at all course sessions. As is appropriate to the importance attributed to the fellow as teacher, colleague and learner, the stipend is considerably greater than that for the standard teaching assistantship.

"It should be noted that the Danforth grant is awarded to the College, which is responsible for the administration of the program and the selection of fellows, and that it is the College, rather than the graduate division or departments, which is providing the impetus for this kind of training."

HOWARD UNIVERSITY — Dr. Harold E. Finley

Dr. Finley is a Commissioner of CUEBS and head of the Department of Zoology at Howard University. He has wide interests in the improvement of undergraduate education in biology.

UNIVERSITY OF ILLINOIS, URBANA — Dr. George Kiefer, Dr. Joseph R. Larsen

"At the present time we have two major areas aimed at improving the biology offerings that directly affect the overall program of turning out better college biology teachers. We have completely overhauled our basic course for our pre-professional students including those who will go into the teaching of biology and we have also made a major commitment to the initiating of a doctoral program in teaching arts.

"While at the conference I would be most desirous of discussing with the other participants the content of their basic offering in biology for entering students and how it relates to subsequent courses in their life science areas. If anyone is present who is currently using audio-tutorial methods in their basic biology course, I would be delighted to have a frank evaluation of their program in terms of a meaningful understanding of biology professions. I would also very much like to discuss our doctor of teaching arts program as would, I am sure, Dr. George Kiefer, who will also be in attendance at the conference. We feel the need of a doctor of teaching arts to be of primary consideration in the training of biology teachers whose major interest is teaching rather than research. I am also rather heavily involved in the Master's program in the teaching of biological sciences. There appears to be a heavy demand

for this type of individual in the junior college programs. I would be extremely interested in discussing the Master's program with other members of the conference in terms of what sort of training they are giving the M.S. people whose primary orientation is the teaching of biology in the junior colleges."

Doctor of Arts in Biology - University of Illinois

The School of Life Sciences, at the University of Illinois, is presently developing a Doctor of Arts program for college biology teachers. The projected doctoral problem differs in character but not in quality from the traditional doctorate.

After completion of the entrance requirements, a three year program is proposed in which two years are devoted to course work and the development of teaching techniques and/or materials, while a third year is reserved for the completion of a research thesis and teaching internship. Each of the four course work semesters will emphasize a major area of biological organization (i.e. population biology). The core of the program will be a tutorial-workshop, meeting daily, at which time ideas will be generated, problems suggested, projects, tools and techniques developed, expertise brought in tapping the broad resource potentials of the University when necessary, desirable or applicable, and general cameraderie provided. The candidate will enroll in one or two graduate courses related to the semester theme.

To maintain a high level of competency and biological awareness, graduates of the program will periodically return to the University to participate in a summer institute program at which time they will be apprised of current happenings in the biological (and other) sciences.

In general, the objectives of the program will require that the candidate demonstrate:

I. Commitment

a. synthesized an individual philosophy of science;
b. developed a working philosophy of education

II. Professional competence

a. breadth
b. depth

III. Ancillary skills in

a. administrative
b. communicative
c. currency

INDIANA UNIVERSITY — Mr. Gregg Anderson, Mr. Randy Horine

Both are graduate students intimately involved in teaching undergraduates. They should be able to contribute much to the conference in showing how preparation of college biology teachers looks to those being prepared.

MARQUETTE UNIVERSITY — Dr. Robert G. Thompson

"Regarding endeavors at Marquette in this direction, let me cite the following:

"1. There are courses available, in the Education Department, dealing with Principles of College Teaching, Development of Higher Education and Internship opportunities (see enclosed). Unfortunately, few Ph.D. candidates from academic departments other than Education enroll in these courses (and none from Biology, Chemistry, or Physics).

"2. Our Department is currently designing a terminal Master's degree aimed at students interested in Junior or Liberal Arts college teaching. We are considering a curriculum that provides not only broad academic area knowledge but course work in areas as described in (1) above.

"3. We have also been discussing a change in the 'duties' of the teaching assistant. Heretofore, T.A.'s only guided laboratory sections. We are considering that they should have experience in lecturing as well and should become involved in the preparation, revision, etc.

"I would certainly be interested in discussing similar types of programs with other people. More specifically, I would like to find ways for getting research-oriented faculty to see the value of some type of formal course work in teaching methods, testing, curriculum, etc., as part of graduate programs in the sciences."

UNIVERSITY OF MINNESOTA

Dr. Norman S. Kerr
Dr. Frederick Forro, Jr.

Dean Kerr writes, "As requested, I am enclosing a brief paragraph on areas which I would like to discuss. This is abstracted from a document I distributed to our faculty last fall.

Questions for CUEBS Conference on preservice preparation of college biology teachers:

(1) How should we train prospective college biology teachers to be teachers?
(2) How should the formal course work differ for prospective college biology teachers? It seems likely that these students will need a broader background including a heavy practicum (laboratory) orientation than might other graduate students.
(3) What sort of training in research do prospective college biology teachers need? We must be certain these individuals are infected with the excitement of discovery so that they will (a) keep themselves intellectually alive for up to 40 years after they complete their formal training, and (b) be able to stimulate students and encourage their undergraduate students to undertake independent study projects. I suspect that this means that college biology teachers must themselves remain active in the research laboratory."

Dr. Frederick Forro writes, "Our department is trying to evolve toward a scheme of involving all graduate students in discussion leader teaching with faculty guidance as a part of their programs but we are still embryonic in these efforts and are heavily cognizant of the problems posed by multiple sources of financial support. I am particularly interested in obtaining information on the nature of the market place for products of graduate education and discerning from this whether future emphasis should be an adding some teaching training to all degree candidates or whether a degree other than the traditional Ph.D. is a more promising path to our needs."

NATIONAL SCIENCE FOUNDATION — Dr. Alfred F. Borg

Although he is very much involved in improving the quality of undergraduate science education in all aspects, Dr. Borg has expressed a special interest in learning about alternatives to the traditional Ph. D.

NORTHERN ILLINOIS UNIVERSITY — Dr. James A. McLeary

"The Biology Department of Northern Illinois University is applying to begin offering the Ph.D. in 1970. The preparation of our graduate students for teaching and/or research positions includes the following as quoted from the application.

> Internship: All students who are candidates for doctoral degree in the biological sciences must serve at least one semester in a supervised college teaching capacity unless exempted by the department.

"In addition the candidate must successfully complete the following course:

> B. Sci. 689 Seminar in College Teaching in Biology (2) Discussion and conferences on problems, techniques, and actual practice in college teaching.

"I would prefer to be in a group discussing the above areas."

THE OHIO STATE UNIVERSITY — Mrs. Phyllis E. Jackson, Mr. Jeffrey J. Jackson

"Training is on the job and varies depending on the supervising instructor.

"Most new graduate teaching assistants receive their first assignments in the two introductory biology courses. As their competence increases they are usually diverted into advanced courses.

"Because teaching assistants want and need some guidance we have prepared handouts and conducted voluntary workshops for teaching assistants in the introductory courses with which we are involved. Some topics have been the operation

of equipment, taxonomy of educational objectives, lesson planning, test construction, and statistics for tests. Our goals are limited because no extra time in the teaching assistant's schedule is set aside for learning to be a teacher.

"We in the Biology Core Program have submitted to the academic faculties in the college a proposal that organized teacher preparation be a part of the graduate program. If accepted, this program will go into effect summer quarter, 1970.

"one of our main interests is audio-tutorial instruction. We are hoping to meet other participants involved in A-T."

PURDUE UNIVERSITY

Dr. Robert Hurst
Dr. David Husband
Dr. Michael Forman

Dr. Forman writes that he is especially interested in instruction of teaching fellows and special degrees.

WAYNE STATE UNIVERSITY

Dr. Lawrence Levine
Dr. Kay Mayeda

Dr. Levine writes:

"There are some special efforts being made to better prepare some teaching assistants for their assignments. I can speak for those assistants in freshman biology, about 25% of the total departmental corps.

"These assistants instruct in laboratories and discussion sections. Weekly meetings are held to explain current exercises, delineate specific laboratory operations and discuss pedagogical devices. Weekly consultations are held to structure quizzes, and assess their results. I usually check laboratory sections so that necessary aid may be given to practice what we teach.

"I would like to hear more discussions about special degree programs. Most of us recognize the problems you have defined, and await the opportunity to explore them further and seek solutions."

UNIVERSITY OF WISCONSIN, MILWAUKEE

Dr. Robert L. Costello
Dr. Newtol Press

Dr. Costello writes:

"We have departmental training programs for teaching assistants in each department. These I think are pretty much the usual weekly meeting type of thing. There was a broader L & S College program under development but with a change of administration in that college there has been a lag in this possibility. Our Associate Dean in Science, worked hard in this area last year but with the change in command his recommendations have not been implemented this year. We have a general week orientation program for the TA's in the fall, but I don't think the interest is sustained throughout the year."

Dr. Press writes:

"About three years ago the College of Letters and Science here inaugurated a formal program to provide orientation sessions and instructions for incoming Teaching Assistants. It was felt that a Teaching Assistantship was a substantial education experience for the T.A. that could: (1) assist the graduate student in coming to a decision about undertaking teaching: (2) set standards of quality for teaching: (3) provide guidelines for future development of teaching potential. The program for Teaching Assistants has become less centralized, with individual departments (perhaps appropriately) undertaking most of the routine activities and setting the tone for students in the diverse disciplines. In biology, most of the emphasis has been related to laboratory and discussion phases of introductory course. A shortcoming of this program is that it does not provide for graduate students who are not Teaching Assistants.

"Many questions are worth while raising about this and similar programs, but the one I would most like to see on a program for discussion is that of providing for in-service ongoing education of practicing biology teachers."